Template for ISB Documentation of Stressors

A. General Information: Stressor Ranking

1. Name or Location of Example/Approach: Multiple Lines of Evidence approach – sediment quality

2. Literature/Citations Used: Bay et al. (2007) Evaluating Consistency of Best Professional Judgment in the Application of a Multiple Lines of Evidence Sediment Quality Triad. Integrated Environmental Assessment and Management — Volume 3, Number 4—pp. 491–497

3. Reviewer(s): Elizabeth Canuel

B. Specific Questions:

1. What stressors are considered? Contaminated sediments – experts were asked to rank sites after being provided with sediment chemistry, sediment toxicity, and benthic infaunal community condition data for 25 sites.

2. Are stressors categorized? If so, how? No ranking

3. Are the relations between stressors and management objectives modeled, and if so, how?

Although the experts were highly correlated with respect to ordinal site rankings, considerable differences in how the experts rated the sites categorically were present.The significance of these results for making management decisions depends on the nature of the question. The effect on large-scale assessments in which the objective is to identify the worst locations or describe the relative condition of sites is likely to be small because there was good agreement among the experts in terms of overall condition classification and relative site ranking. The effect will be more significant with respect to making management decisions for specific sites, particularly those with intermediate levels of contamination, toxicity, or biological alteration, in that these sites could be variously classified as likely unimpacted (no remediation needed), inconclusive (more data needed), or likely impacted (potential remediation).

4. If stressors are prioritized, describe the general approach.

5. How might this approach be relevant to Bay Delta?

Several steps are recommended to reduce the uncertainty associated with the integration and interpretation of sediment quality triad data. First, key elements of the assessment

strategy, such as the relative weight of each LOE, how multiple LOEs will be combined (e.g., scores, ranks, logic frameworks), and the criteria for determining the assessment conclusion should be determined during the design of the study. Second, comparability among studies can be improved by providing guidance on specific methods for measuring sediment chemistry (e.g., analyte list, detection limits, how sediment quality guidelines are used), sediment toxicity (e.g., test methods, toxicity classification thresholds), and benthic community condition (e.g., which metrics or indices to use, criteria for determining the effects). Finally, uncertainty in sediment quality assessment can be reduced through improved training of the individuals interpreting the data.

6. Follow up regarding additional questions/literature review/etc?

Template for ISB Documentation of Stressors

A. General Information: Stressor Ranking

1. Name or Location of Example/Approach: sediment decision-making framework

2. Literature/Citations Used: Chapman & Anderson (2005) A decision-making framework for sediment contamination. Integ. Env. Assessment and Management 1: 163-173.

3. Reviewer(s): Elizabeth Canuel

B. Specific Questions:

1. What stressors are considered? Contaminated sediments

2. Are stressors categorized? If so, how?

4 guidance "rules": (1) sediment chemistry data are only to be used alone for remediation decisions when the costs of further investigation outweigh the costs of remediation and there is agreement among all stakeholders to act; (2) remediation decisions are based primarily on biology; (3) lines of evidence (LOE), such as laboratory toxicity tests and models that contradict the results of properly conducted field surveys, are assumed incorrect; and (4) if the impacts of a remedial alternative will cause more environmental harm than good, then it should not be implemented.

3. Are the relations between stressors and management objectives modeled, and if so, how?
Provides decision matrix for weight of evidence (WOE) categorization

4. If stressors are prioritized, describe the general approach. Weight of evidence

5. How might this approach be relevant to Bay Delta?

This paper provides objective approaches and information useful in guiding restoration efforts and ecosystem responses.

6. Follow up regarding additional questions/literature review/etc?

Template for ISB Documentation of Stressors

A. General Information: Stressor Ranking

1. Name or Location of Example/Approach:

2. Literature/Citations Used: Barnett, A.M., S.M. Bay, K.J. Ritter, S.L. Moore and S.B. Weisberg (2008) Sediment Quality in California Bays and Estuaries. Southern California Coastal Water Research Project Technical Report 522.

3. Reviewer(s): Elizabeth Canuel

B. Specific Questions:

1. What stressors are considered? Contaminated sediments

2. Are stressors categorized? If so, how? multiple lines of evidence (MLOE) assessment framework.

3. Are the relations between stressors and management objectives modeled, and if so, how?

4. If stressors are prioritized, describe the general approach.

Chemistry, toxicity, and benthic community data, each representing an independent line of evidence (LOE) regarding sediment quality, from six surveys conducted over eight years were analyzed. The analysis consisted of three parts: 1) determining sediment condition at each sampling station (site) using the assessment framework; 2) establishing a single integrated data set with known spatial attributes from the combined data of each survey; and 3) analyzing the integrated data set using spatial statistics to determine the percentage of area corresponding to each sediment condition category.

5. How might this approach be relevant to Bay Delta?

Provides objective approach for identifying regions impacted by stressors.

Results from this study indicate that sediment condition categories present in San Francisco Bay differed from other regions; no sites were classified as Unimpacted and the proportion of area classified as Possibly Impacted (77%) was more than three times greater than that measured in the other regions.

Regional differences in sediment quality identified through the assessment framework were evaluated by analysis of the underlying LOEs (Chemistry, Toxicity, and Benthic Community) to examine various levels of response within each site's sediment. The

incidence of biological effects (toxicity or benthic community disturbance) was greatest in SFB and appeared to account for the comparatively high percent area classified as Possibly Impacted or Likely Impacted. The large percentage of Possibly Impacted area within SFB suggests that sediment contaminants are more widespread and less concentrated in this region, possibly due to contaminant dilution and redistribution as a result of greater rainfall, high runoff inputs from urban and agricultural sources, and tidal mixing. There is also evidence that the relationship between sediment contamination and toxicity in SFB differs from that observed in other regions. As the causes of toxicity in California embayments have not been identified, the reason for this apparent difference in toxicity response cannot be determined. Unmeasured contaminants, such as current use pesticides, may be influencing these relationships. It is also possible that contaminant bioavailability differs between regions or that different contaminants are causing toxicity in each area.

6. Follow up regarding additional questions/literature review/etc?